

Notes on the reproduction of the Barn Owl *Tyto alba* in the Atlantic plains of semi-arid Morocco

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Note sur la reproduction de l'Effraie des clochers *Tyto alba* dans les plaines atlantiques du Maroc semi-aride. L'Effraie des clochers est largement répandue au Maroc, y compris en région désertique. Son régime alimentaire a été bien étudié mais seuls quelques cas de reproduction étaient connus jusqu'à présent. Cette note détaille 22 cas observés dans les plaines atlantiques de Doukkala et Chaouia. Les nids y sont établis préférentiellement en milieu anthropisé (minarets de mosquées, châteaux d'eau, ...). La taille moyenne des pontes s'élève à 5,91 œufs, le taux d'éclosion à 73,1%, et le succès global de reproduction à 53,8%. Les causes d'échec incluent l'utilisation des jeunes dans la pharmacopée populaire, la disparition d'œufs (plusieurs ingurgités par les Effraies elles-mêmes), le cannibalisme et la désertion des nids. Les pontes sont très étalées, déposées de début janvier à début avril, occasionnellement jusqu'à mi-mai. 101 proies ont été inventoriées dans les nids; leur liste est donnée en annexe.

Barn Owl *Tyto alba* is widespread throughout Morocco, including low montane and desert regions^{5,6}. Its diet has been extensively studied but only a few breeding records are known (synthesis in Thévenot *et al*⁶). This note puts together the elements that have been collected in the Doukkala and Chaouia region, around the towns of El Aounate and Ouled Said, and is largely based on a study of 22 breeding attempts by the species in this area. Doukkala and Chaouia are part of the 'Middle Atlantic Plains', and are situated within a semi-arid environment (Figs 1–2).

Results and discussion

Nest location

In Morocco, the Barn Owl basically breeds on cliffs, although nests have been recorded in old wells¹, a hay stack³, a mine gallery⁴, or in various types of matorral (scrub communities of sclerophyllous shrubs or low trees, below 7 m), olive orchards, palm trees and *Eucalyptus* woodland. It also occupies numerous towns and villages,

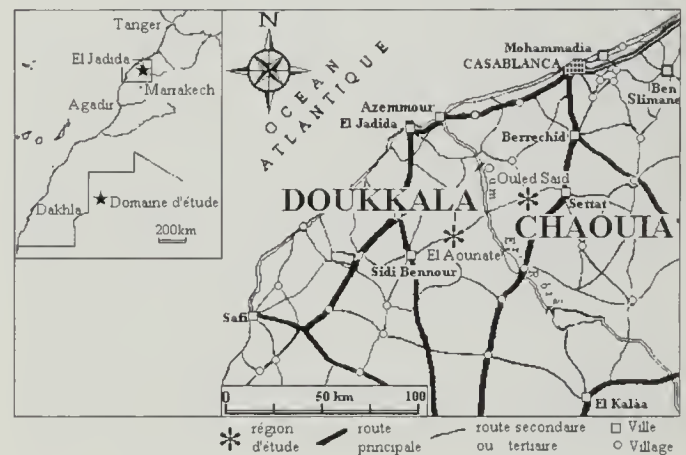


Figure 1. Location of Doukkala and Chaouia in Morocco.

Localisation de Doukkala et Chaouia au Maroc.

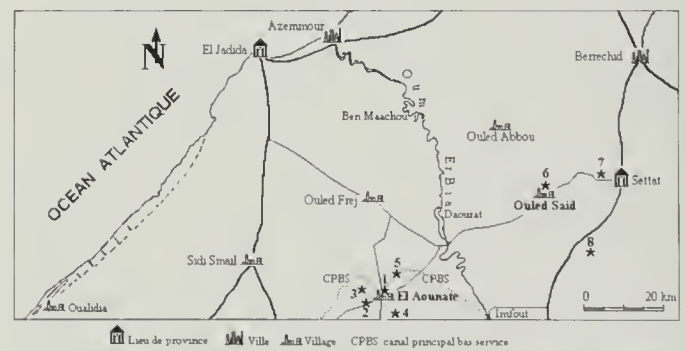


Figure 2. Detailed map of Doukkala and Chaouia.

Carte détaillée de Doukkala et Chaouia.

Table 1. Number of breeding attempts recorded annually.

	1999	2000	2001	2002	2003
No. of breeding pairs recorded	1	6	5	7	3

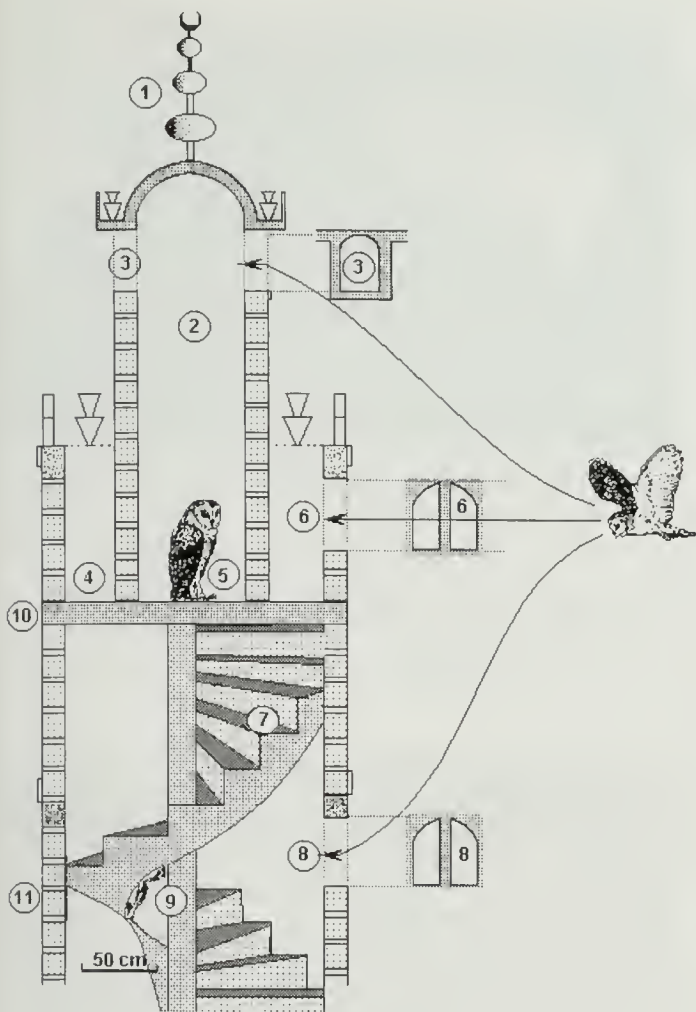


Figure 3. An example of a minaret, that of Mesmara mosque: 1. 'Jamour'; 2. Calling room ('Adane'); 3. Cuts of the calling room; 4. Terrace; 5. Possible Barn Owl nest; 6. Cuts of the terrace (east and south); 7. Reinforced concrete helicoid staircase; 8. Ventilation cuts; 9. Other possible Barn Owl nest; 10. Reinforced concrete.

Exemple d'un minaret: celui de la mosquée de Mesmara. 5 et 9 indiquent l'emplacement possible de deux nids d'Effraie des clochers.

including old kasbahs (castles), and man-made structures such as water towers, bell towers and barns⁶.

Twenty-five nest sites were found in the study area, most in man-made constructions, including nine (36%) in the calling room of the minaret of mosques (Fig 3). Five others (20%) were in water towers, three (12%) in chimneys or the false ceiling of schools, and two (8%) each in palm trees (*Phoenix* and *Washingtonia*), wells, ruins and cliffs.

Breeding parameters

Detailed results are presented in Appendix 1.

Clutch size

Mean clutch size was 5.91 eggs (N = 22 clutches, total of 130 eggs) and is close to that recorded in Europe, eg in Burgundy, France (mean = 5.7 eggs, N = 325 first clutches, or mean = 6.3, N = 475 first and second clutches²). Clutch size is highly variable, the smallest being of three eggs and the largest of 11 eggs; the latter was in a year of large numbers of Black Rats *Rattus rattus* at Ouled Ben Lahcen (standard deviation = 2.18 eggs, N = 22).

Elsewhere in Morocco, we are aware of only three nests of five eggs, one of six and another of seven⁶, but Valverde⁷ found clutches of 10–14 eggs and a nest with 13 young, at Smara in Saharan Morocco, during summer/autumn 1952, which were seasons of rodent plague.

Hatching rate

Hatching rate (ie, the ratio between the number of hatched eggs / number of eggs observed) was 73.1% (N = 95 hatched eggs).

Brood size at fledging

Seventy young fledged, giving an overall breeding success rate of 53.8% and a brood success rate of 73.7%. If we exclude the removal of young from the nest linked with popular medical belief (six young removed, see below), success rates respectively reach 58.5% (76/130) and 80% (76/95).

Causes of clutch and brood failure

The following causes of failure have been recorded.

Removal of young from nest. In Moroccan popular belief, the Barn Owl—and often the Little Owl *Athene noctua* as well—is said to cure skin diseases; the birds are slaughtered, the feathers removed and the remainder cooked and eaten. During the study six young were removed from nests: in 2000, a pair at Zouair laid four eggs, of which three hatched; one of the young was removed and the two others fledged normally, whilst in the same year, at Moudnine, five young in a nest acquired their full-grown plumage but were subsequently removed. We have recorded only one other instance of deliberate removal—not linked to popular belief—by the new warden at Zouair mosque, in 2002. The young at Mesmara mosque were killed in 2003, probably by children.

Egg loss. Nineteen eggs disappeared during the breeding cycle, most of them after the third egg had hatched (eg one egg in 1999 and three eggs in 2000 at Mesmara mosque, and one egg at Zouair mosque on 7 May 2000). Most eggs were probably removed by the adult Barn Owls, as such behaviour was video-taped at Ouled Saïd mosque, on 18 May 2002, when the female destroyed then consumed three eggs that had failed to hatch. The remains of one egg (membrane and shell) were also found in a pellet at Zemmamra.

Cannibalism / Cainism. The corpses of four young, partially eaten, were found at nests in Mesmara and El Aounate mosques. Such incidences probably result from a lack of food during poor weather; two other recently hatched young disappeared during the continuous rains of April 2002 at Ouled Moussa.

Desertion of nests. Two nests of the 22 (9.1%) were deserted for unknown reasons. On 6 March 2001, a Barn Owl was incubating four eggs at Mesmara; one month later, one egg hatched, then the nest was deserted. Also in 2001, the pair at Zouair mosque deserted its five eggs.

Laying date

In the Atlantic plains of semi-arid Morocco, eggs are laid early, from early January to early April, occasionally until mid-May (Fig 4). There is no record of a second clutch.

As an example, the data relating to two nests in Chaouia (Ouled Saïd and Ouled Ben Lahcen) in 2002 are presented below.

Ouled Saïd mosque

17 February: nuptial displays
 31 March: seven eggs
 15 April: nine eggs
 22 April: two young and six eggs
 29 April: four young and three eggs
 11 May: six young and one egg
 18 May: five young
 Five young fledged early July

Ouled Ben Lahcen mosque

14 March: 11 eggs
 16 April: seven young and three eggs
 4 May: nine young
 5 June: nine young in adult plumage
 Nine young fledged

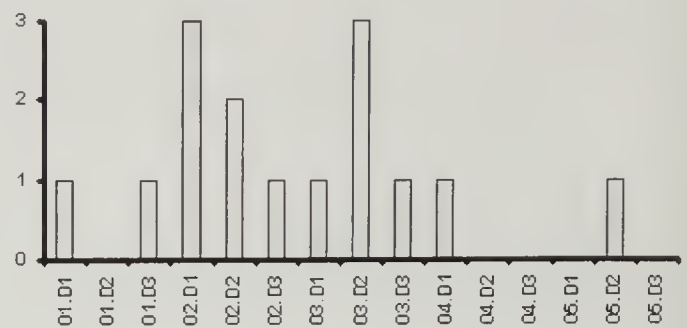


Figure 4. Number of clutches laid per 10-day period in the Atlantic plains of semi-arid Morocco (dates are shown as month, then 10-day period, eg 05.D3 = the third 10-day period of May, ie 20–31 May).

Nombre de pontes par décade dans les plaines atlantiques du Maroc semi-aride (le premier chiffre indique le mois, le deuxième la décade, par exemple 05.D3 = troisième décade de mai, du 20 au 31 mai).

Surplus prey recorded at nest

One hundred and one surplus prey items were recorded during our visits to nests. They included 58 mammals (56 were rodents), 42 birds (mainly House Sparrow *Passer domesticus*) and one amphibian. Appendix 2 details the list of prey, but we provide some examples below.

Zouair mosque, in 2000:

- 28 April: three eggs and one young, with four prey items: 1 *Lemniscomys barbarus*, 2 *Mus spretus*, 1 *Passer domesticus*.
- 7 May: three young and seven prey items: 2 *Gerbillus campestris*, 1 *Gerbillus nanus*, 1 *Mus spretus*, 3 *Passer domesticus*.
- 13 May: three young and eight prey items: 4 *Gerbillus campestris*, 1 *Gerbillus nanus*, 2 *Mus spretus*, 1 *Passer domesticus*.
- No prey at nest when the young are 20 days old.

Mesmara mosque, in 2000:

- 9 March: six eggs and two prey items: 1 *Gerbillus campestris*, 1 *Passer domesticus*.
- 30 March: three eggs, two young and seven prey items: 6 *Passer domesticus*, 1 *Mus musculus*.
- 6 April: three young and eight prey items: 7 *Passer domesticus*, 1 *Anthus campestris*.

Ouled Saïd mosque, in 2002:

- 31 March: seven eggs and eight prey items: 2 *Gerbillus maghrebi*, 5 *Mus spretus*, 1 *Mus musculus*.

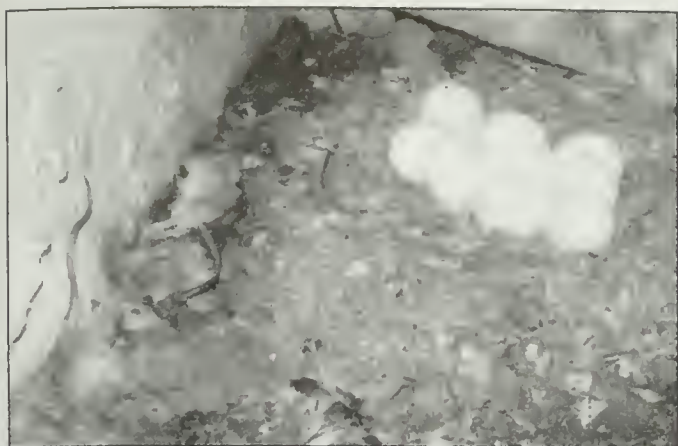


Figure 5. Clutch of nine Barn Owl *Tyto alba* eggs at Ouled Said mosque, 15 April 2002. Prey include mice *Mus* spp (Abdeslam Rihane)

Ponte d'Effraie des clochers *Tyto alba* de neuf œufs dans la mosquée d'Ouled Said, 15 avril 2002. Les proies comprennent des souris *Mus* spp (Abdeslam Rihane)



Figure 6. Brood of nine young Barn Owls *Tyto alba* at Ouled Ben Lahcen, 4 May 2002; this is the largest ever recorded in the Atlantic plains of semi-arid Morocco (Abdeslam Rihane)

Niché de neuf jeunes Effraies des clochers *Tyto alba* à Ouled Ben Lahcen, 4 mai 2002; ceci constitue la plus grande nichée observée dans les plaines atlantiques du Maroc semi-aride (Abdeslam Rihane)

- 15 April: nine eggs, five prey items: 1 *Gerbillus maghrebi*, 2 *Mus spretus*, 2 *Mus musculus*.
- 22 April: six eggs, two young and seven prey items: 3 *Mus spretus*, 3 *Mus musculus*, 1 *Crocidura russula*.
- 29 April: three eggs, four young and nine prey items: 2 *Gerbillus maghrebi*, 2 *Mus spretus*, 1

Mus musculus, 1 *Crocidura russula*, 2 *Passer domesticus*, 1 *Galerida cristata*.

- 11 May: one egg, six young and seven prey items: 7 *Gerbillus maghrebi*.
- 18 May: five young and no prey.

Acknowledgements

We thank all those who contributed to this work, and especially the inhabitants of the villages of Zouair and Ouled Said.

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Appendix 1. Details of Barn Owl *Tyto alba* breeding attempts monitored in Doukkala and Chaouia, Morocco. (CC = size of complete clutch; BH = brood size at hatching; BF = brood size at fledging; DFE = laying date of first egg, with dates being shown as month, then 10-day period (decade), eg, 05.D3 = third decade of May, ie 20–31 May).

Annexe 1. Données concernant la reproduction de l'Effraie des clochers *Tyto alba* à Doukkala et Chaouia, Maroc (CC = taille de la ponte complète; BH = taille de la nichée à l'éclosion; BF = taille de la nichée à la sortie du nid; DFE = date de la ponte du premier œuf, le premier chiffre indiquant le mois, le deuxième la décennie, par exemple 05.D3 = troisième décennie de mai, du 20 au 31 mai).

	Doukkala						Chaouia			
	Mesmara mosque	Zouair mosque	Ouled Moussawater tower	Ouled Moussa school	EI Aounate school	Moudnine school	EI Aounate mosque	Ouled Saïd mosque	Ouled Ben Lahcen mosque	Zemmamra
1999										
CC	4									
BH	3									
BF	3									
DFE	03.D3									
2000										
CC	6	4	5	3	5	6				
BH	3	3	5	1	4	5				
TNE	3	2	4	1	4	0				
DFE	02.D1	03.D2			03.D2					
2001										
CC	4	5	6		5		5			
BH	1	0	6		5		5			
BF	0	0	6		5		2			
DFE	02.D3		02.D2				05.D2			
2002										
CC	5	3	8		4		6	9	11	
BH	2	0	7		4		4	6	9	
BF	0	0	4		4		4	5	9	
DFE	02.D1		03.D1		04.D1			03.D2	02.D2	
2003										
CC	8							9	9	
BH	6							8	8	
BF	0							7	7	
DFE	01.D3							01.D1	02.D1	

Appendix 2. Prey items found at nests of Barn Owls *Tyto alba* in Doukkala and Chaouia, Morocco.

Annexe 2. Proies trouvées dans des nids de l'Effraie des clochers *Tyto alba* à Doukkala et Chaouia, Maroc.

Mammals		58	Birds		42
Insectivora			Galliformes		
Soricidae	<i>Crocidura russula</i>	2	Phasianidae	<i>Coturnix coturnix</i>	2
Rodentia			Passeriformes		
Gerbillidae	<i>Gerbillus campestris</i>	8	Alaudidae	<i>Galerida cristata</i>	1
	<i>Gerbillus nanus</i>	2	Motacillidae	<i>Anthus campestris</i>	
	<i>Gerbillus maghrebi</i>	12	Fringillidae	<i>Carduelis carduelis</i>	1
Muridae	<i>Lemniscomys barbarus</i>	1	Passeridae	<i>Passer domesticus</i>	37
	<i>Rattus rattus</i>	8	Amphibians		1
	<i>Mus spretus</i>	17	Anoures		
	<i>Mus musculus</i>	8	Ranatidae	<i>Rana sp.</i>	1
			Total		101